

LISTING OF THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

1.(Currently Amended) An electromagnetic field stimulator device for Anatomic Biophysical Chondroprotection, in which means of current generation (~~7, 18 and 20~~) are suitable for powering at least one solenoid (~~24~~) to generate an electromagnetic field directed on a part of the human body (~~26~~) including cartilaginous tissue (~~27~~),

characterized in that the said means of current generation (~~7, 18 and 20~~) supplies said solenoid (~~24~~) with current ($i(t)$) having a waveform that includes the repetition of a linear ramp with a certain slope; said current ($i(t)$) causing the generation of an electromagnetic field that induces on a control probe (~~32~~) irradiated by said electromagnetic field, a voltage (V_{in}) of markedly constant amplitude during the ramp-like linear growth period of said current ($i(t)$).

2. (Currently Amended) A device according to claim 1, in which said means of current generation includes at least one table (~~7~~) in which at least one function ($f(t)$) is stored that provides, for each value of a scanning signal in input (sc), an output value that expresses a target current intensity (I_{out}), the said function $f(t)$ being a linear one and representing a ramp with a certain slope that supplies, for increasing values of said scanning signal in input (sc), linearly increasing values of said target current intensity (I_{out}).

3.(Currently Amended) A device according to claim 2, in which said table (~~7~~) contains a number of functions ($f(t)$) of different, selectable types.

4.(Currently Amended) A device according to claim 2, in which timer devices (~~3 and 4~~) are provided that are suitable for generating said scanning signal in input (sc).

5.(Currently Amended) A device according to claim 2, in which attenuator devices (~~10~~) are provided with their input communicating with the output of said table (~~7~~), said attenuator devices (~~10~~) being suitable for reducing the value of said target current intensity (I_{out}) in function of a programmable parameter (IPK) to limit the maximum value of said current ($i(t)$) feeding said solenoid (~~24~~).

6.(Currently Amended) A device according to claim 1, in which a feedback system (~~28, 29, 30, 12 and 14~~) is provided that performs continuous monitoring of said current ($i(t)$) present in said solenoid (~~24~~), comparing (~~12~~) a measured current value (I_{mis}) with a reference value (~~7~~, I_{out}); in cases of variances between the two said values, due to changes in impedance of said solenoid (~~24~~), said feedback system automatically takes care of adjusting the value of said current ($i(t)$) feeding said solenoid (~~24~~) in order to maintain the waveform of said induced voltage (V_{in}) unaltered.

7.(Currently Amended) A device according to claim 6, in which said feedback system (~~28, 29, 30, 12 and 14~~) includes:

detector devices (~~28 and 29~~) suitable for supplying said measured current value (I_{mis}), and
subtraction devices (~~12~~) suitable for generating an error signal in function of said measured current value (I_{mis}) and of said reference value (~~7~~, I_{out}).

8.(Currently Amended) A device according to claim 7, in which a generator circuit (~~18 and 20~~) is provided that receives said error signal in input and generates an alternating analogue power signal ($S(t)$) having a fixed frequency and variable duty cycle in function of said error signal, said variable duty cycle being suitable for regulating the intensity of said current ($i(t)$).

9.(Currently Amended) A device according to claim 8, in which said generator circuit (~~18 and 20~~) includes a pulse width modulator (~~18~~).

10.(Currently Amended) A device according to claim 8 , in which low-pass filter devices ~~(22)~~ are provided between the output of said generator circuit ~~(18 and 20)~~ and the said solenoid ~~(24)~~.

11.(Currently Amended) A device according to claim 1, in which said solenoid ~~(24)~~ is made from a number of sheets of a flexible material to adapt itself to the shape of said portion of the human body ~~(26)~~.

12.(Currently Amended) A method for Anatomic Biophysical Chondroprotection, comprising the phases of:

generating an electromagnetic field and applying it to a portion of the human body ~~(26)~~ including cartilaginous tissue ~~(27)~~,

characterized by the fact that said phase of generating an electromagnetic field includes the phase of:

powering a solenoid ~~(24)~~ with current $(i(t))$ having a waveform that includes the repetition of a ramp with a certain slope, said current $(i(t))$ causing the generation of an electromagnetic field that induces on a control probe ~~(32)~~ irradiated by said electromagnetic field, a voltage (V_{in}) of markedly constant amplitude during the period of ramp-like linear growth of said current $(i(t))$.

13.(Currently Amended) A method according to claim 12, in which said current $(i(t))$ presents an intensity and said solenoid ~~(24)~~ presents a configuration such that said electromagnetic field penetrates in depth into said portion of the human body ~~(26)~~ until it permeates said portion of cartilage ~~(27)~~ and a portion of subchondral bone associated with said portion of cartilage ~~(27)~~ over their entire thickness and in their entire extension, to activate at least one of the following processes at intracellular level:

a process of articular inflammation control regarding both subchondral bone and the articular structures,

a process of articular inflammation control capable of acting in a specific manner on the adenosinic receptors A2A of the cell membrane of pro-inflammatory cells, neutrophils, doubling the number of bonds with adenosine,

a process of inhibiting the catabolic effect of inflammatory cytokines acting directly on the chondrocyte and on the cartilaginous matrix,

a process of increasing the metabolic activity of chondrocytes and the synthesis of proteoglycans,

a process of inhibiting degeneration of articular cartilage, preserving the integrity of the same articular cartilage,

a process of rapid healing of subchondral bone tissue,

a process of healing bone marrow edema regarding the subchondral bone of femoral condyles, and

a process of healing and integration of bone grafts after ligament reconstruction operations on the fibrous flexor sheaths of the knee.

14.(Currently Amended) A method according to claim 12, in which said current presents an intensity and said solenoid (24) presents a configuration such that said electromagnetic field penetrates in depth into said portion of the human body (26) until it permeates said portion of cartilage (27) and a portion of subchondral bone associated with said portion of cartilage (27) over their entire thickness and in their entire extension, to activate, in the presence of an osteo-cartilaginous graft, a preservation process for the viability of said portion of cartilage (26) and trigger at least one of the following effects:

inhibition of reabsorption phenomena on the underlying bone,

rapid anchorage of graft,

good osteointegration of graft, and

inhibition of the formation of bone cysts.

15.(Currently Amended) A method according to claim 12, in which said solenoid (~~24~~) is made from a number of sheets of a flexible material to adapt itself to the shape of said portion of the human body (~~26~~).